Nanostructured Architectures as High Temperature Ceramic TBCs and Abradable Surfaces

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Invited Presentation

Nanostructured Architectures as High Temperature Ceramic TBCs and Abradable Surfaces

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The microstructural and compositional tailoring of coating systems for use as protective and functional surfaces at elevated temperatures are key aspects in the development of the next-generation engines for the aerospace and industrial gas turbine fields. As higher operating temperatures, improved performance characteristics and longer lifetimes are being targeted, it is clear that new material compositions and more sophisticated design strategies are needed. Among the approaches currently being investigated for engineering high temperature ceramic surfaces is the thermal spray deposition of coatings employing nanostructured powders. Through careful control of the process, coatings can be tailored to contain a significant percentage of nanostructured material. The presence of these nanozones can affect both the mechanical and thermal properties of the coating. The presentation will focus on some of the important aspects related to engineering these materials and on the processing strategies employed for tailoring nanostructured coatings to impart specific characteristics. Results of an investigation involving yttria-stabilized zirconia will be used to show the types of architectures that can be produced and to demonstrate the microstructural response of the novel structures when exposed to high temperatures. Details concerning the thermal and elastic properties will be presented and the results analyzed and discussed in terms of some of the potential advantages of employing this design strategy for engineering high temperature coatings.

***Presenter**

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